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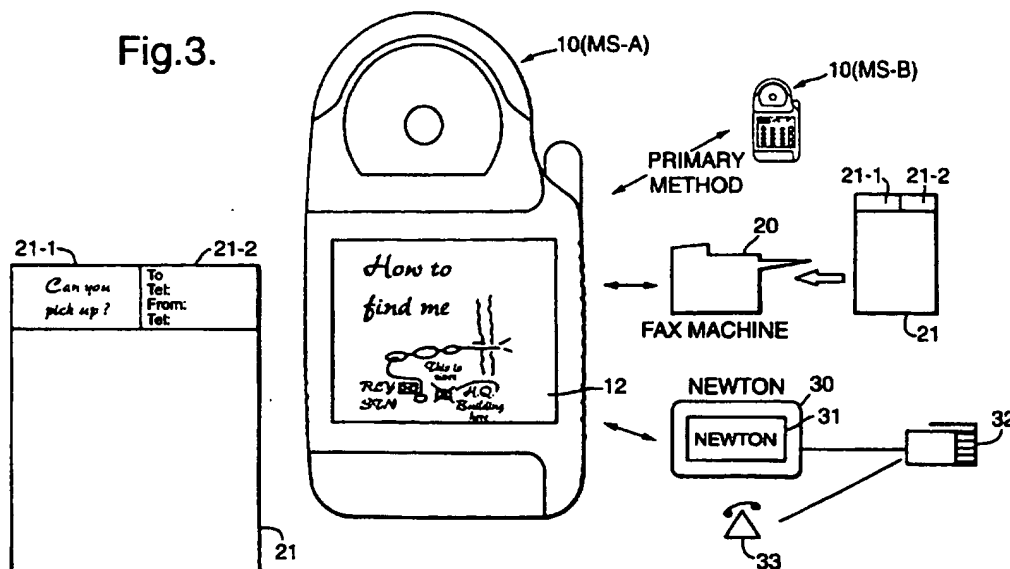
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UK CL (Edition O) **H4K KFH**
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(54) Transferring graphical messages between mobile telephones

(57) Mobile telephones (10 (MS-A), 10 (MS-B)) which are connectable via a digital cellular radio (GSM) network (40) via associated network switching stations (NSS-A, NSS-B) are provided with touch-sensitive display screens (12). A handwritten image entered on the screen of one device 10 (MS-A) is sent as a data message to and stored in a store and forward unit (SF) provided with the network 40, and when the destined device 10 (MS-B) is connected to its switching station (NSS-B) the store and forward unit (SF) forwards the data message to be displayed on the screen of that device 10 (MS-B). Handwritten images may also be communicated between a mobile device (10 (MS-A)) and a fixed G3 document facsimile transceiver 20; the handwritten image in this case is converted between mobile device screen size and predetermined part (21-1) of a document facsimile image (21) either in the mobile device (10 (MS-A)) or in the store and forward unit (SF).

Fig.3.



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Fig.1A.

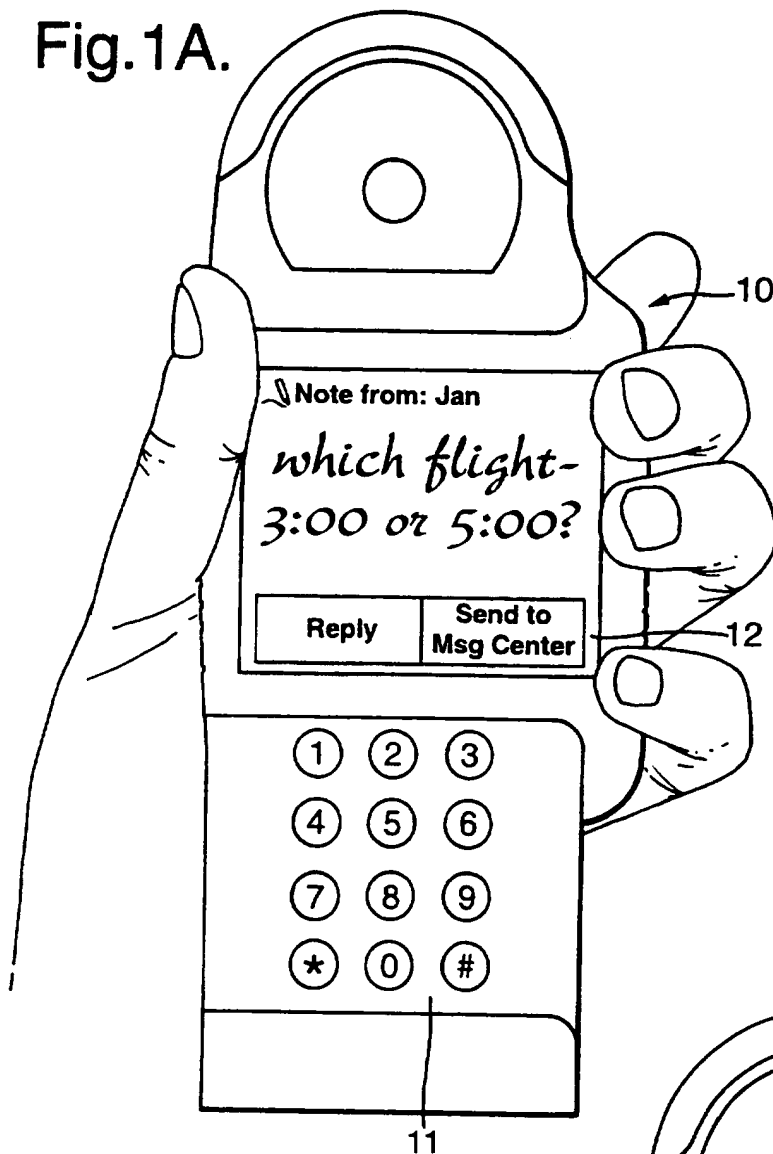


Fig.1B.

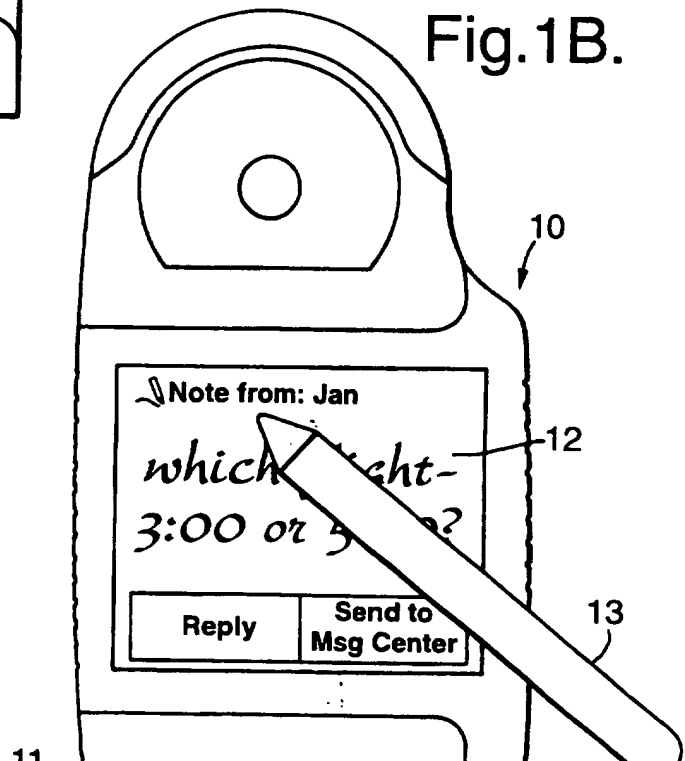
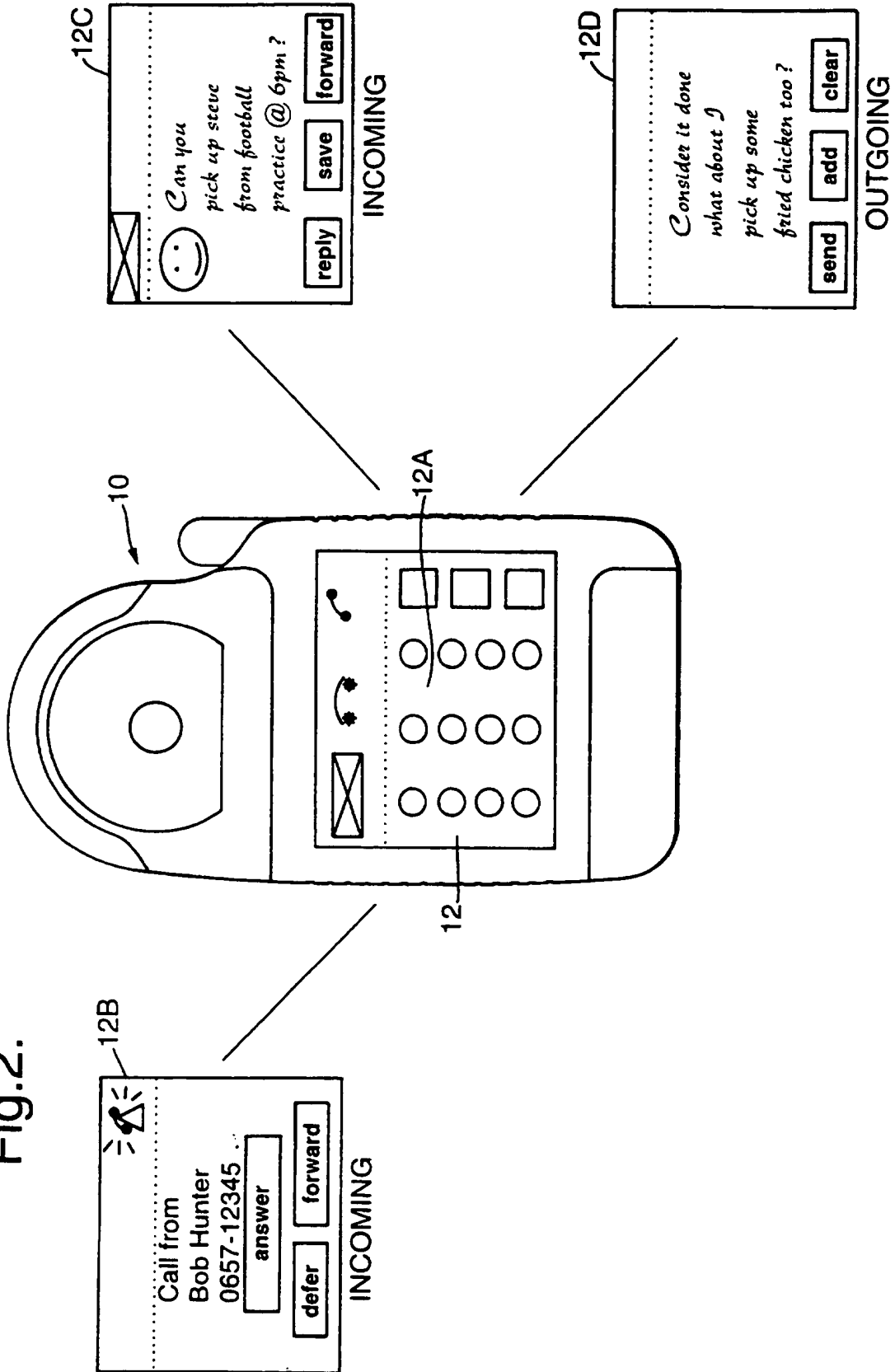


Fig.2.



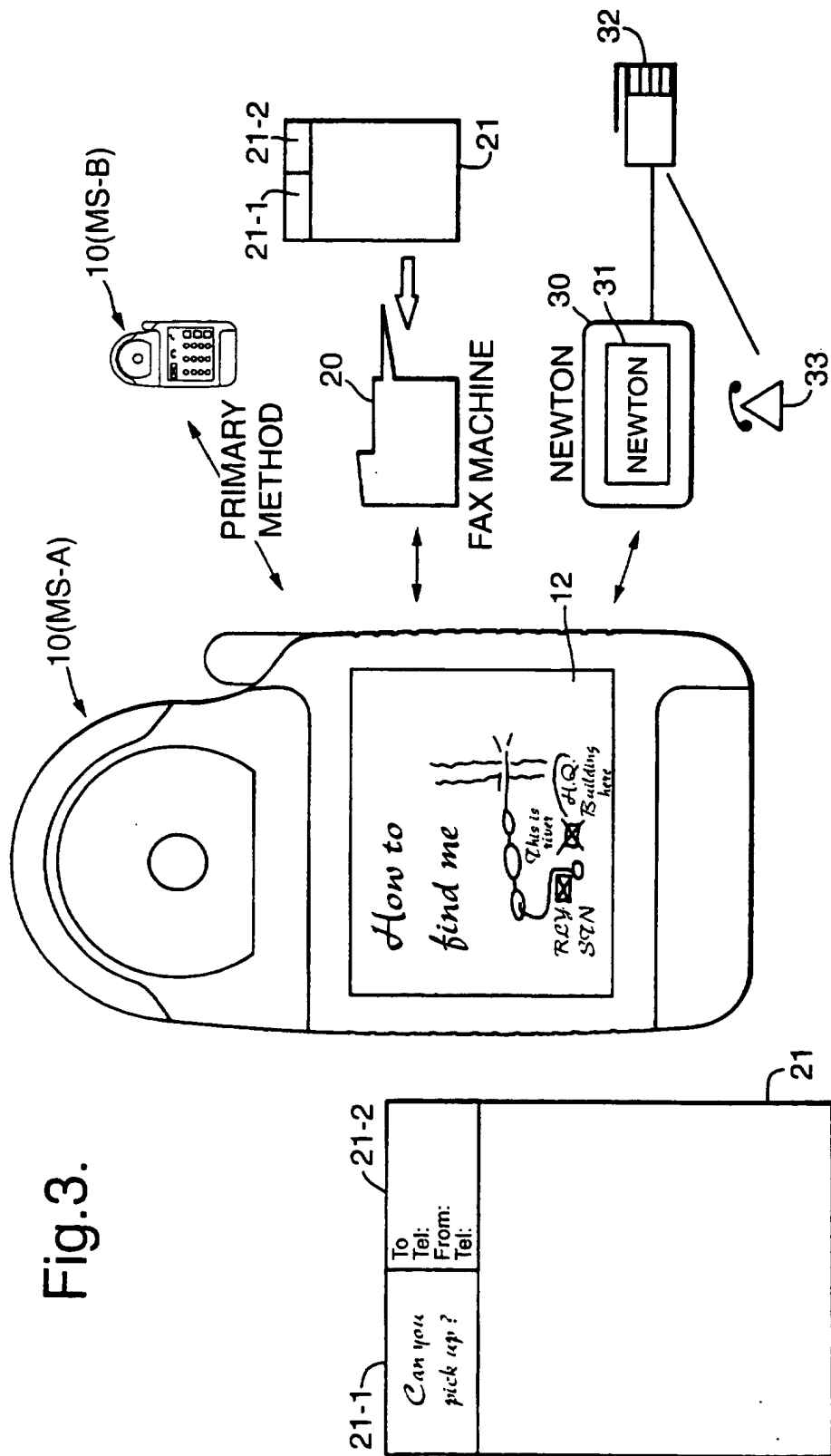


Fig.4.

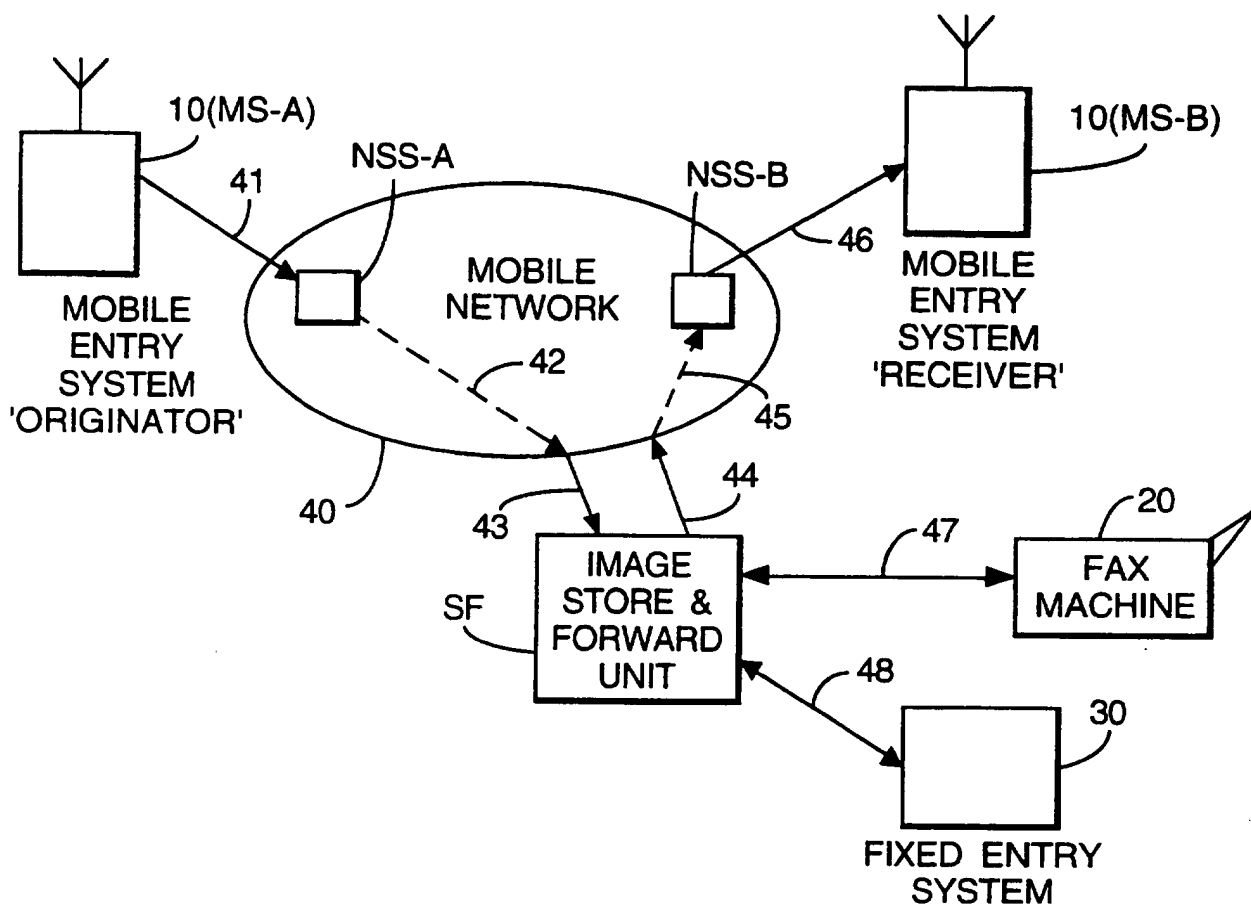
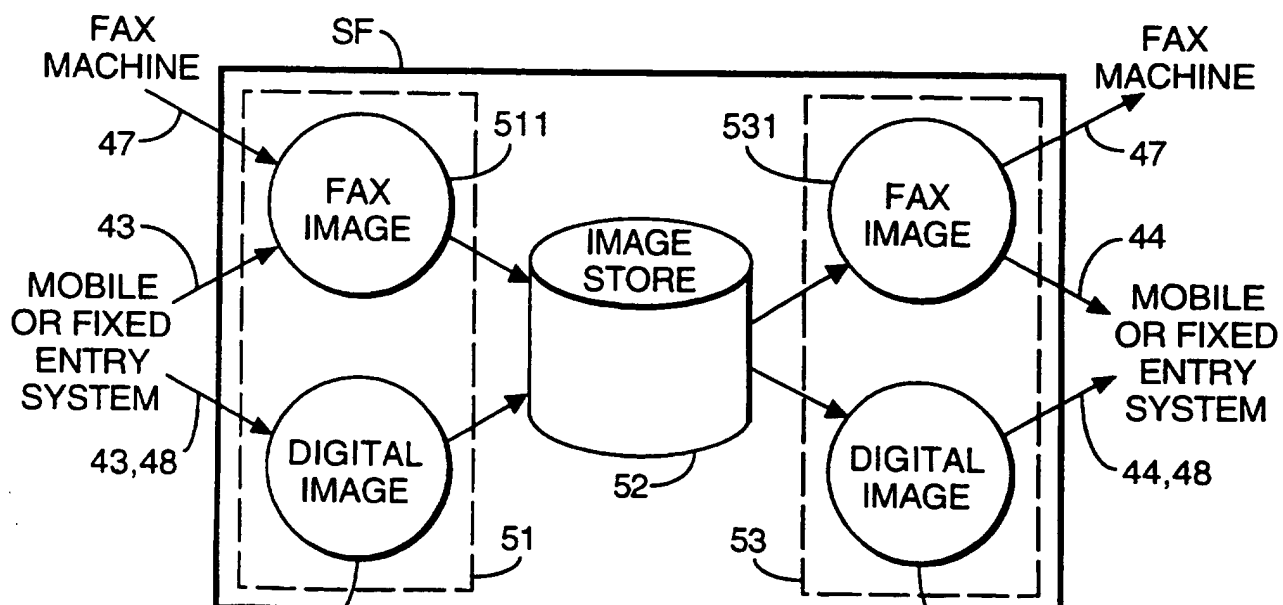
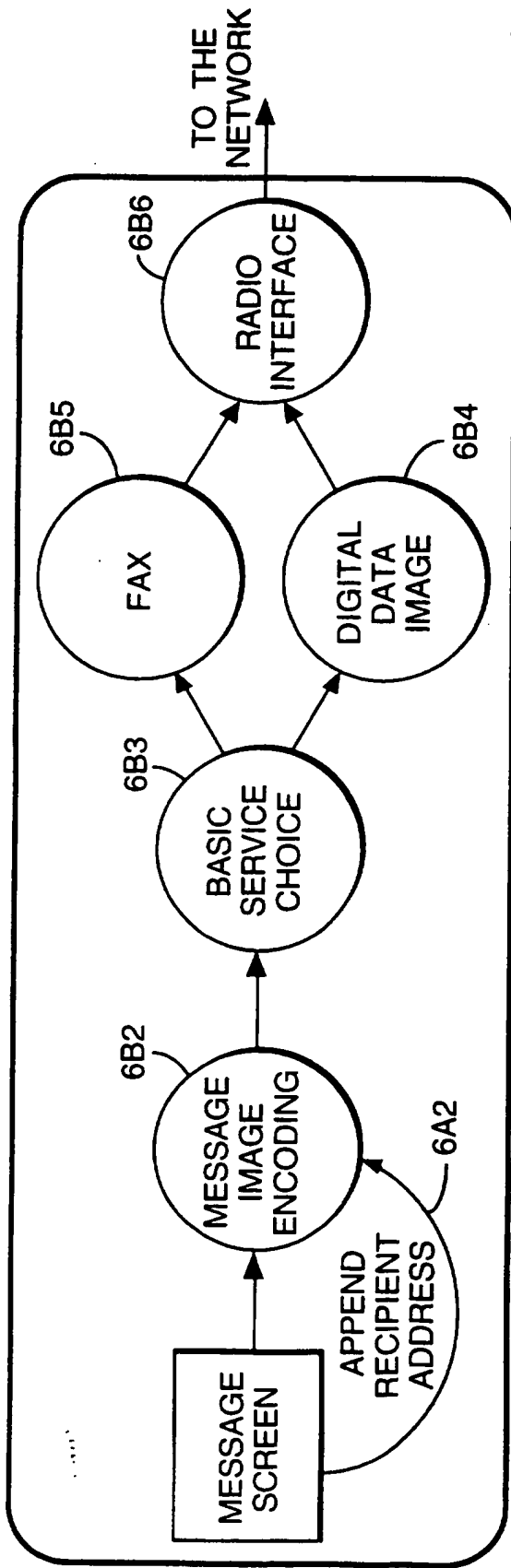


Fig.5.



3.6A.



3.6B.

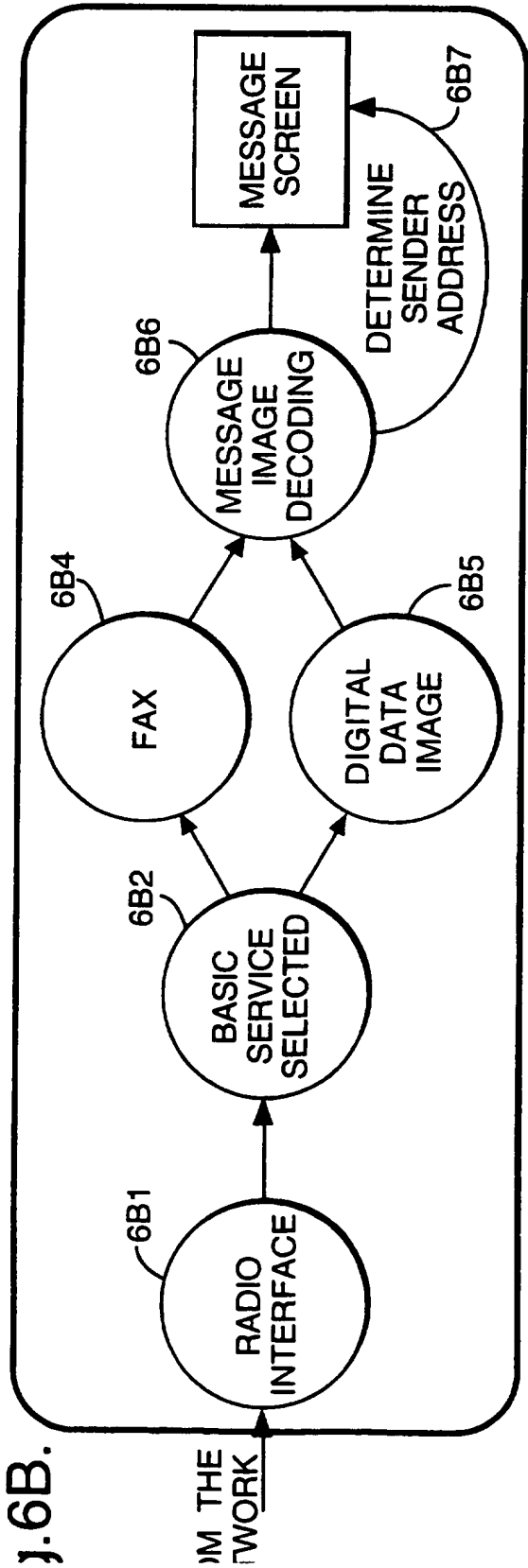


Fig.7.

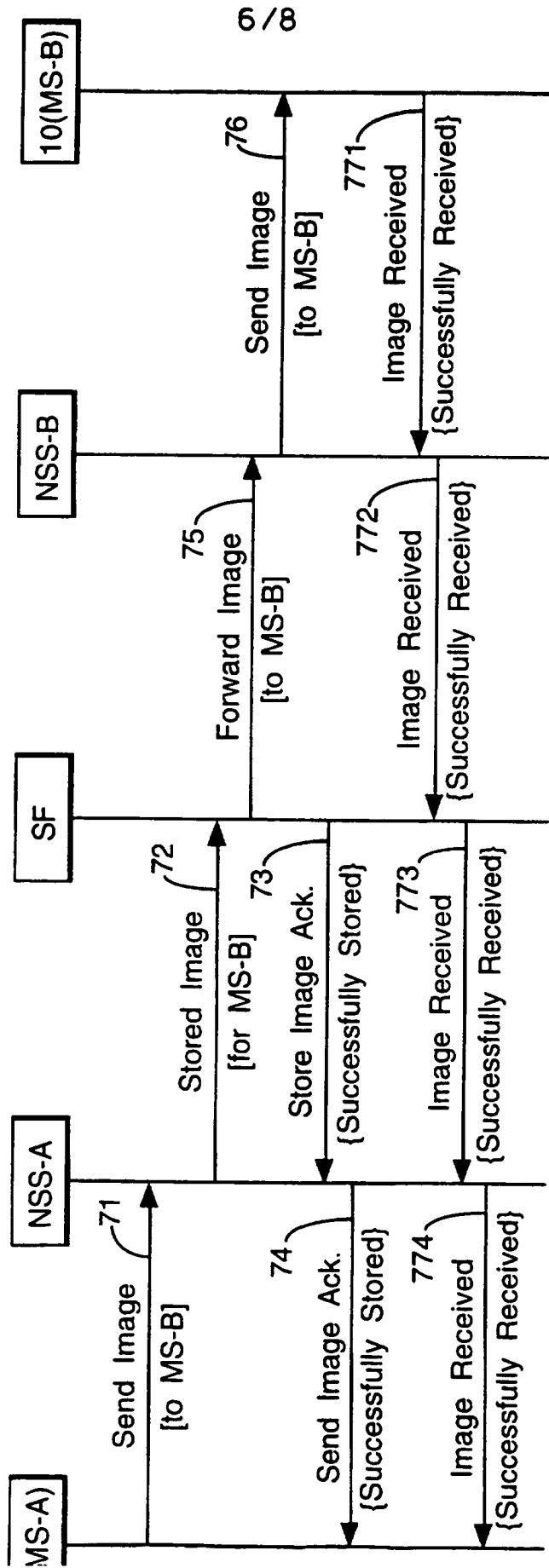
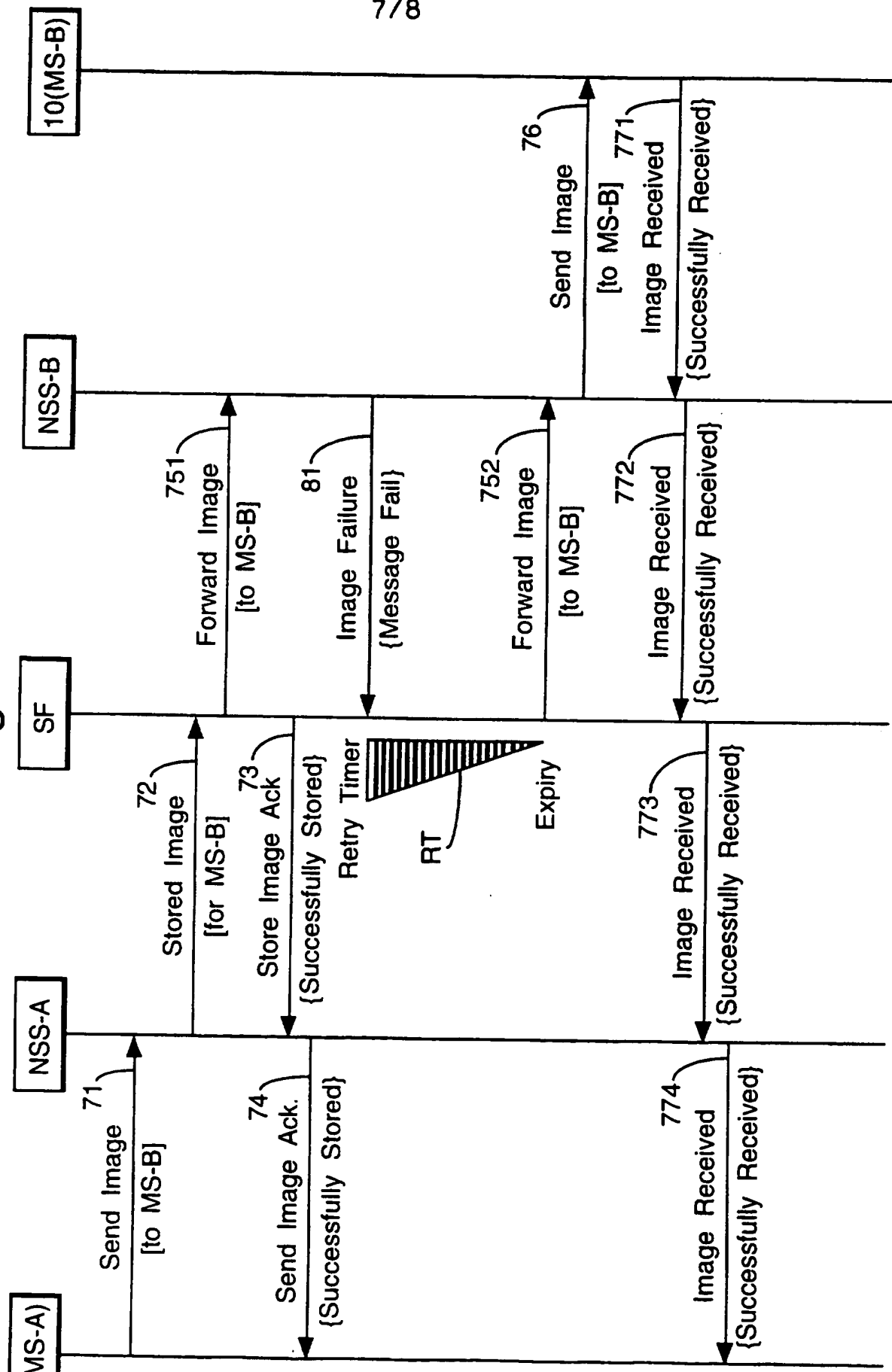


Fig.8.




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sequenceDiagram
    participant MS-A
    participant NSS-A
    participant SF
    participant NSS-B
    participant MS-B

    MS-A->>NSS-A: 71 Send Image [to MS-B]
    NSS-A->>SF: 72 Stored Image [for MS-B]
    NSS-A->>SF: 73 Store Image Back {Successfully Stored}
    SF->>NSS-B: 751 Forward Image [to MS-B]
    SF->>NSS-B: 81 Image Failure {Message Fail}
    SF->>NSS-B: 92 Mobile Present
    SF->>NSS-B: 753 Forward Image [to MS-B]
    NSS-B->>MS-B: 91 Mobile Present
    NSS-B->>MS-B: 76 Send Image
    NSS-B->>MS-B: 771 Image Received [to MS-B]
    NSS-B->>MS-B: {Successfully Received}
    NSS-A->>MS-A: 74 Send Image Ack. {Successfully Stored}
    NSS-A->>MS-A: 773 Image Received {Successfully Received}
    NSS-A->>MS-A: 774 Image Received {Successfully Received}
    
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Transferring Graphical Messages between Mobile Telephones

This invention relates to a communications system, including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile device via network switching stations.

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The BNR journal 'Telesis', issue number 97 published December 1993 includes an article on pages 4 to 13 entitled "Orbiter: a new personal communications concept". Orbiter is disclosed as a pocket-sized portable wireless device intended to support voice, messaging, and graphical notes capabilities.

10

Figures 1A and 1B of the accompanying drawings reproduce photographs of a mock-up that is a non-operational physical model, of the Orbiter device as shown in the 'Telesis' article. Figures 1A indicates the size of the device 10 by showing it being hand-held. Figure 1A also shows a slide-out telephone push-button panel 11; in Figure 1B this panel is pushed in. Figures 1A and 1B both show what is proposed as a touch-sensitive display screen 12, having an area of approximately 5cm x 4cm. It is proposed that prompts would appear on the screen to guide users and by pressing the chosen response on the screen, for example "Reply" or "Send to Msg Center" as shown on Figures 1A and 1B, the action would be carried out. The screen 12 also shows a handwritten graphical message, "which flight - 3:00 or 5:00?" received from another such device 10, and in Figure 1B there is shown a detachable stylus 13 for entering such a message on the screen 12.

15

20

25

The "Telesis" article does not specify any particular means or method for communications between the devices 10, and in particular no indication is given as to how the handwritten messages may be communicated.

5

One object of the present invention is to provide for communications of handwritten messages between portable devices such as shown in the 'Telesis' article.

- 10 According to a first aspect of the present invention there is provided a communications system including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations; wherein each said mobile device has a touch-sensitive display screen
- 15 on which can be entered a handwritten graphical image destined for another said mobile device, first converting means for converting said graphical image onto at least part of an image data message suitable for transmission via said network, and second converting means for converting at least a corresponding part of a said image data message
- 20 received via said network into a graphical image for display on said screen; wherein said network is provided with an image store and forward unit connectable between a first said network switching station associated with a first said mobile device sending a said image message and a second said network switching station associated with a second
- 25 said mobile device for which said image message is destined, said store and forward unit having an image store with means for storing said image message sent from said first mobile device via said first network switching station, and said store and forward unit having transmitting means including means for transmitting a stored image message via
- 30 said second network switching station when said second mobile device is connected to said second network switching station.

Use of the store and forward unit as indicated above, in a manner analogous to that used in paging systems, enables non real time

35 delivery of the handwritten image to the destined mobile device as soon

as that device is able to receive it so that the user of that device may perceive receipt of the image to be real time.

5 In the above specified system, preferably said image data message includes a first message part corresponding to a first screen-size image having said handwritten image and a second message part corresponding to a second screen-size image having address information, said first and second screen-size images being
10 being consecutively entered on the screen of a said first mobile device and being consecutively displayed on the screen of a said second mobile device.

15 Preferably, said store and forward unit has means responsive to successful storage of said image message for providing an image-stored signal for transmission back to said first mobile device via the first network switching station. It is advantageous for the sender to have this indication of progress of the message through the system.

20 Preferably, each said mobile device has means responsive to successful receipt of said image message when said mobile device is a said second mobile device for providing an image-received signal for transmission back to the corresponding first mobile device via the second network switching station, the store and forward unit and the first
25 network switching station. It is advantageous for the sender thereby to have confirmation of delivery of the handwritten image.

One way of enhancing fast and reliable delivery of the image message in the system of the invention is wherein the store and forward unit first
30 forwards a stored image message to a said second network switching station without an indication from that second network switching station whether or not said second mobile device is connected thereto, and wherein the store and forward unit includes retry timing means such that, responsive to an indication from that second network switching
35 station of failure to connect to said second mobile device, the store and

forward unit again forwards that stored image message to that second network switching station after a predetermined time interval.

5 Another way of enhancing fast and reliable delivery of the image message in the system of the invention is wherein the store and forward unit first forwards a stored image message to a said second network switching station without an indication from that second network switching station whether or not said second mobile device is connected thereto, wherein the store and forward unit is responsive to an indication
10 from that second network switching station of failure to connect to said second mobile device to retain stored that image message, and wherein the store and forward unit is responsive to a later indication from that second network switching station of connection to said second mobile device to again forward that stored image message to that second
15 network switching station.

The above-mentioned article in 'Telesis' does not contemplate direct communication of images between the screen of an 'Orbiter' portable device and a document facsimile transceiver without an add-on facsimile
20 unit connected to the portable device.

A further object of the present invention is to provide for such communication.

25 Accordingly, a communications system according to the first aspect of the invention, optionally with any of the preferred features as specified above, may be provided wherein said communications system includes means for effecting connection between a said mobile device and a document facsimile transceiver via a first said network switching station
30 associated with that mobile device and via a said image store and forward unit, and said digital network has the facility for conveying document facsimile images in a predetermined Fax data format;

wherein in a said mobile device so connectable to a said facsimile transceiver via said network, said first converting means includes means
35 for converting a said handwritten graphical image entered on said screen and destined for a said facsimile transceiver into at least part of a

said image data message having said Fax data format in which said screen entered graphical image occupies a predetermined portion in a predetermined position with respect to a document facsimile image, and said second converting means includes means for converting said
5 predetermined portion in said predetermined position of a document facsimile image received as a said image data message having said Fax data format into a graphical image for display on said screen; and wherein

said image store of a said image store and forward unit has
10 means for storing a said image message having said Fax data format when received from a said mobile device or from a facsimile transceiver, and said transmitting means of a said image store and forward unit has means for transmitting in said Fax data format a stored said image message when connection is established between a said mobile device
15 and a said facsimile transceiver.

In the above system for sending a handwritten graphical image between a mobile device and a document facsimile transceiver, preferably said image data message having said Fax data format includes a first Fax
20 message part having a screen entered said handwritten image occupying a first said predetermined portion in a first said predetermined position with respect of a document facsimile image and a second Fax message part having a screen entered address image occupying a second predetermined portion in a second predetermined position with
25 respect to a document facsimile image, said first and second Fax message parts having corresponding first and second screen-size Fax image parts consecutively entered on the screen of a said mobile device sending to a document facsimile transceiver or respectively consecutively displayed on the screen of a said mobile device receiving
30 from a document facsimile transceiver.

The system for sending a handwritten graphical image between a mobile device and a document facsimile transceiver as specified in either of the two preceding paragraphs may be modified in that the image data
35 message sent from a said mobile device and destined for a said facsimile transceiver is not in said Fax data format and in that the

transmitting means of the store and forward unit includes means for converting an image data message sent from a said mobile device into said Fax data format for transmission to said facsimile transceiver, the system also being modified in that an image data message received in
5 said Fax data format from a said facsimile transceiver and destined for a said mobile device is converted by the store and forward unit into a data format for transmission to said destined mobile device as if that image data message had come from another said mobile device.

- 10 The above first-mentioned object of the invention to provide for communication of handwritten messages between portable devices such as shown in the 'Telesis' article is also achieved according to a second aspect of the invention by providing a method of sending and receiving image messages in a communications system including a plurality of
15 pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations, the method including the steps of;

entering on a touch-sensitive display screen of a first said mobile device a handwritten graphical image destined for a second said mobile
20 device;

converting said destined graphical image into at least part of an image data message suitable for transmission from said first mobile device via said network;

25 sending said image message from said first mobile device via a first said network switching station associated with said first mobile device to an image store and forward unit provided with said network;

storing said image message in said image store and forward unit;

connecting said image store and forward unit to said second mobile device via a second said network switching station associated
30 with said second mobile device;

transmitting said image message from said store and forward unit to said connected second mobile device;

converting a corresponding at least part of said image message received in said second mobile device into a received graphical image;
35 and

displaying said received graphical image on a corresponding touch-sensitive display screen of said second mobile device.

5 In the above specified method, preferably said image data message includes a first message part corresponding to a first screen-size image having said handwritten image and a second message part corresponding to a second screen-size image having address information, the method including the further steps of consecutively entering said first and second screen-size images on the screen of a
10 said first mobile device and consecutively displaying said first and second screen-size images on the screen of a said second mobile device.

Preferably, the method includes the further steps of;
15 said store and forward unit providing, responsive to successful storage of said image message, an image-stored signal, and said store and forward unit transmitting said image-stored signal back to said first mobile device via the first network switching station.

20 Preferably, the method includes the further steps of;
said second mobile device providing, responsive to successful receipt of said image message, an image-received signal, and said second mobile device transmitting said image received signal back to the first mobile device via the second network switching
25 station, the store and forward unit and the first network switching station.

The method may include the further steps of;
the store and forward unit first forwarding a stored image message to a said second network switching station without an
30 indication from that second network switching station whether or not said second mobile device is connected thereto; and the store and forward unit, responsive to an indication from that second network switching station of failure to connect to said second mobile device, again forwarding that stored image message to that
35 second network switching station after a predetermined time interval.

Alternatively or in addition to the further steps specified in the preceding paragraph, the method may include the further steps of;

the store and forward unit first forwarding a stored image message to a said second network switching station without an
5 indication from that second network switching station whether or not said second mobile device is connected thereto;

the store and forward unit, responsive to an indication from that second network switching station of failure to connect to said second mobile device, retaining stored that image message; and

10 the store and forward unit, responsive to a later indication from that second network switching station of connection to said second mobile device again forwarding that stored image message to that second network switching station.

15 The above-mentioned further object of the invention to provide for communication of images between the screen of a portable device and a document facsimile transceiver without an add-on facsimile unit connected to the portable device is also achieved according to a third aspect of the invention by a method of sending and receiving image
20 messages in a communications system including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations, said communications system including means for effecting connection between a mobile device and a document facsimile
25 transceiver via a network switching station associated with that mobile device, said digital network having the facility for conveying document facsimile images in a predetermined Fax data format; the method including the steps of;

entering on a touch-sensitive display screen of the mobile device
30 a handwritten graphical image destined for the facsimile transceiver;

converting in said mobile device said image into part of an image data message having said Fax data format and in which the graphical image occupies a predetermined portion in a predetermined position of a document facsimile image;

35 sending the document facsimile image as an image data message from said mobile device via the network switching station

associated with said mobile device to an image store and forward unit provided with said network;

storing the image data message in the store and forward unit;
connecting the image store and forward unit to the destined facsimile
5 transceiver; and

transmitting said image message from said store and forward unit to said connected facsimile transceiver.

10 In the above method for sending a handwritten graphical image from a mobile device to a document facsimile transceiver, preferably the method includes the further steps of;

entering on said screen of said mobile device an address image destined with said handwritten image for said facsimile transceiver; and

15 converting in said mobile device said destined address image into a second Fax message part of said image data message, said second Fax message part occupying a second predetermined portion in a second predetermined position with respect to the document facsimile image.

20 The method as specified in either of the two preceding paragraphs may be modified in that the image data message sent from said mobile device and destined for said facsimile transceiver is not in said Fax data format, and in that the method includes the further step of;

25 converting said image message stored in said image store and forward unit into said Fax data format prior to transmitting said image message to said connected facsimile transceiver.

30 The above-mentioned further object of the invention is also achieved according to the third aspect of the invention by a method of sending and receiving image messages in a communications system including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations, said communications system including means for effecting connection between a document facsimile
35 transceiver and a said mobile device via a said network switching station associated with that mobile device, said digital network having the

facility for conveying document facsimile images in a predetermined Fax data form; the method including the steps of;

entering into a said facsimile transceiver a graphical image destined for a said mobile device,. said graphical image occupying a predetermined portion in a predetermined position as part of a document facsimile image;

sending said document facsimile image as an image message in said Fax data format to an image store and forward unit provided with said network;

storing said image message in said image store and forward unit; connecting said image store and forward unit to said destined mobile device via a said network switching station associated with said mobile device;

transmitting said image message from said store and forward unit to said mobile device;

converting in said mobile device said predetermined portion in said predetermined position of said document facsimile image received as said image message into said graphical image; and

displaying said graphical image on the display screen of said mobile device.

In the above method for sending a graphical image from a document facsimile transceiver to a mobile device, preferably the method includes the further steps of;

converting in said mobile device said second predetermined portion in said second predetermined position of said document facsimile image received as said image message into said address image; and

consecutively displaying said handwritten image and said address image on said screen of said mobile device.

The method as specified in either of the preceding two paragraphs may be modified in that it includes the further step of;

converting said image message stored in said image store and forward unit from said Fax data format into a data format as if that image

message had come from a said mobile device prior to transmitting said image message to said destined mobile device.

Exemplary embodiments of the present invention will now be described
5 with reference to Figures 2 to 9 of the accompany drawings, in which;

Figure 2 shows a pocket-sized mobile telephone device, similar to that
shown in Figures 1A and 1B, with its touch-sensitive display
screen as it appears for telephone voice calls and also as it
10 appears, in accordance with the invention, for incoming and
outgoing handwritten graphical images,

Figure 3 schematically illustrates the functions of communication of a
handwritten graphical image between the mobile device and
15 another mobile device, or a document facsimile transceiver or a
notepad computer,

Figure 4 shows the overall architecture of a communications system for
achieving the functions illustrated in Figure 3,
20

Figure 5 shows the internal structure and function of the image store and
forward unit which is part of the system shown in Figures 3 and 4,

Figures 6A and 6B illustrate the internal function and structure of the mobile
device of Figures 2 and 3, Figure 6A relating to outputting a two-
25 part image entered on its screen as an image message to the
radio network shown in Figure 4 for display as a two-part image on
its screen,

30 Figure 7 shows a signal flow diagram illustrating successful first-time
dispatch of an image message from a sending mobile device to a
destined mobile device,

Figure 8 shows a signal flow diagram illustrating unsuccessful first time
35 forwarding of an image message from the store and forward unit

shown in Figures 4 and 5 followed by successful such forwarding after a retry interval timed in the store and forward unit, and

Figure 9 shows a signal flow diagram illustrating unsuccessful first time forwarding of an image message from the store and forward unit shown in Figures 4 and 5 followed by successful such forwarding after connection of the destined mobile device to the network has been indicated.

Figure 2 shows a pocket-sized mobile telephone device 10 which is the same as the Orbiter device already described and shown in Figures 1A and 1B except that, instead of a slide-out telephone push-button panel, a telephone push-button panel is shown as one manifestation of a display 12A on the touch-sensitive display screen 12. The telephone call function is illustrated by the display 12A being provided on the screen for making an outgoing call and the display 12B indicating an incoming call. A digital cellular radio communications network, in particular but not necessarily according to the GSM standard system, is provided for connecting mobile devices 10 via network switching stations as will be described later. Handwritten graphical images as messages can also be communicated between the mobile devices 10. The screen display 12C shows such an incoming handwritten message as received from another mobile device 10 and displayed on the screen 12. The screen display 12D shows such an outgoing handwritten message entered on the screen 12, using a stylus 13 as already mentioned and shown in Figure 1B, destined for and ready to be sent to another mobile device 10.

Figure 3 shows three ways of communicating handwritten graphical images within the scope of the present invention. Firstly there is shown communication of a mobile device screen-size handwritten graphical image between two mobile devices, that is device 10 (MS-A) and device 10 (MS-B). Secondly there is shown communication of a handwritten graphical image 21-1 between a fixed data entry system in the form of a document facsimile transceiver 20 and the mobile device 10 (MS-A). A fully-size facsimile document 21 is shown separately in Figure 3, in

which the graphical image 21-1 is part of the facsimile document 21 and an address information image 21-2 is another part of the document 21. The significance of the part images 21-1 and 21-2 will be explained later. Thirdly there is shown communication of a handwritten graphical image
5 between the mobile device 10 (MS-A) and a notepad computer 30 having a touch-sensitive display screen 31; this communication may be effected via a mobile telephone 32 connected to the computer 30 or via a fixed telephone 33 connected to the computer 30.

10 Figure 4 shows the overall architecture of a communications system for achieving the functions illustrated in Figure 3. All communications take place via a digital cellular radio network 40. Communication of a handwritten image between two mobile telephone devices 10 (MS-A) and 10 (MS-B) takes place when a connection is established
15 between a first network switching station NSS-A of the network 40 associated with a sending mobile device 10 (MS-A) and a second network switching station NSS-B of the network 40 associated with a destined mobile device 10 (MS-B) via an image store and forward unit SF provided with the network 40. For convenience of illustration the
20 store and forward unit SF is shown outside the network 40; this is only to indicate that this store and forward unit SF is additional to the usual fixed elements which are provided in the network 40 for voice call communication between the mobile devices 10 (MS-A) and 10 (MS-B).

25 The process of communication of a handwritten graphical image from mobile device 10 (MS-A) to mobile device 10 (MS-B) may be summarised as follows. The user of device 10 (MS-A) enters a handwritten graphical image destined for device 10 (MS-B) on the touch-sensitive screen of that device. A first screen-size image having this
30 destined handwritten image is then encoded and converted into a first message part of an image data message suitable for transmission from the device 10 (MS-A) via the network 40. Address information identifying the originator and the recipient is appended before or after the handwritten image, as a second entered screen-size image which is
35 converted into a second message part of the image data message for transmission from the device 10 (MS-A). Digital cellular radio networks

(including the GSM system) are known to provide channels and protocols for data transmission and the image data message produced in the mobile device 10 (MS-A) will be according to these known provisions for data transmission. The image message is then forwarded
5 (41) to the network 40.

The network 40 will determine the destination of the image message and route it (42, 43), via the first network switching station NSS-A to the store and forward unit SF. The network 40 may be provided with more
10 than one such store and forward unit, and the particular such unit SF shown is an appropriate such unit for routing (44, 45) the image message to the network switching station NSS-B. The image message is stored in the store and forward unit SF and when the image store and forward unit SF has been connected to the destined mobile device 10
15 (MS-B) via the network switching station NSS-B (44, 45, 46) the image message is transmitted from the store and forward unit SF to the mobile device 10 (MS-5).

The received image data message is decoded and converted in the
20 mobile device 10 (MS-B) into a first screen-size image having the handwritten graphical information and into a second screen-size image having the address information and these two images are consecutively displayed on the touch-sensitive display screen of the mobile device 10 (MS-B).

25 The data transmission channels and protocols of the GSM digital cellular radio system include the facility for conveying document facsimile images in a facsimile (Fax) data format according to the Group 3 standard (G3) commonly used for communication between fixed
30 document facsimile transceivers in the public switching telephone network. Figure 4 shows routing (47) via the public switched telephone network between the store and forward unit SF and a G3 document facsimile transceiver 20.

35 The process of communication of a handwritten graphical image from a mobile device 10 (MS-A) to a G3 document facsimile transceiver 20 may

be summarised as follows. The user of device 10 (MS-A) enters a handwritten graphical image destined for the facsimile transceiver 20 on the touch sensitive screen of that device. This destined handwritten image is then encoded and converted in the device 10 (MS-A) into a first
5 Fax message part of an image data message having the G3 Fax data format and occupying the top left hand one-eighth part of a document facsimile image, that is the part 21-1 of document facsimile image 21 as shown in Figure 3. Address information identifying the originator and the
10 recipient is appended by entering on the screen of device 10 (MS-A), before or after the handwritten image, and is encoded and converted into a second image part of the image data message having the G3 Fax data format and occupying the top right hand one-eight part of a document facsimile image, that is the part 21-2 of the document facsimile image 21 as shown in Figure 3.

15 The image data message is then forwarded by the already mentioned route (41, 42, 43) to the store and forward unit SF. This image message is stored in the store and forward unit SF and, when the image store and forward unit SF has been converted to the destined facsimile transceiver
20 20 via the public switched telephone network, the image message is transmitted from the store and forward unit SF to the facsimile transceiver 20.

25 The image message received by the facsimile transceiver in standard G3 facsimile format is printed as a document 21 of standard size having the handwritten graphical image occupying part 21-1 and the address information occupying part 21-2 of the document 21.

30 The process of communication of a handwritten graphical image from a G3 document facsimile transceiver 20 to a destined mobile device 10 (MS-A) may be summarised as follows. The handwritten image is provided on part 21-1 and address information is provided on part 21-2 of a document 21 the image of which is then entered into and transmitted from the facsimile transceiver 20 as an image data message
35 in standard G3 Fax format to the store and forward unit SF.

The image data message is stored in the store and forward unit SF and, when the image store and forward unit SF has been connected to the destined mobile device 10 (MS-A) via the network switching station NSS-A (43, 42, 41) the image message is transmitted in the Fax data
5 format facility of the mobile network 40 to the mobile device 10 (MS-A).

In the mobile device 10 (MS-A) the image message received in Fax data format is converted and decoded to provide a screen-size handwritten graphical image corresponding to part 21-1 of the image message and a
10 screen-size address image corresponding to part 21-2 of the image message, and the handwritten image and the address image are consecutively displayed on the touch-sensitive screen of mobile device 10 (MS-A).

15 In the two communication processes just described, conversion takes place in the mobile device 10 (MS-A) to and from a facsimile (Fax) data format conveyable as a data transmission in the mobile network 40. This may be modified as follows. In communication from the mobile
20 device 10 (MS-A) to the document facsimile transceiver 20 the image data message having the handwritten image as a first part and the address image as a second part is not in the Fax data format, and this image message stored in the image store and forward unit SF is converted into G3 facsimile data format with the handwritten image
25 occupying part 21-2 of the document image and the address image occupying part 21-2 of the document image prior to transmitting this G3 format facsimile document image message to the facsimile transceiver 20. In communication from the document facsimile transceiver 20 to the mobile device 10 (MS-A), the image message received and stored in G3
30 facsimile data format in the store and forward unit SF is converted into a data format as if that message had come from another mobile device prior to transmitting the image message to the destined mobile device 10 (MS-A), the image message received and stored in G3 facsimile data format in the store and forward unit SF is converted into a data format as
35 if that message had come from another mobile device prior to transmitting the image message to the destined mobile device 10 (MS-

A); that is the image message transmitted from the store and forward device SF has a first data message part corresponding only to the handwritten part 21-1 of the facsimile document and a second data message part correspondingly only to the address part 21-2 of the facsimile document.

The process of communication of a handwritten graphical image between the mobile telephone 10 (MS-A) and the fixed data entry and display system 30 shown in Figure 4, which may be the notepad computer 30 previously referred to and shown in Figure 3, will involve routing (48) via the public switched telephone network between the store and forward unit SF and the entry system 30. Appropriate means and methods of conversion between image sizes and data formats and protocols will be provided in a manner analogous to that described above for communication of handwritten graphical images between the mobile device 10 (MS-A) and the document facsimile transceiver 20.

Referring now to Figure 5, there is shown the internal structure and function of the image store and forward unit SF. This unit SF consists of a receiver 51, a store 52, and a transmitter 53. The receiver 51 is capable of receiving an image data message in multiple data entry formats; that is to say into means 511 in G3 (possibly GSM) facsimile data format from a facsimile machine 20, route 47, or a mobile device 10 (MS-A), route 43, or into means 512 in another data format from a mobile device 10 (MS-A), route 43, or from another fixed data image entry system 30, route 48. The store 52 is suitable for retention of the image data message. The transmitter 53 is capable of transmitting the image data message in multiple formats; that is to say from means 531 in G3 (possibly GSM) facsimile data format to a facsimile machine 20, route 47, or a mobile device 10 (MS-B), route 44, or from means 532 in another data format to a mobile device 10 (MS-B), route 44, or to another fixed data image entry system 30, route 48. The transmitter 53 may include the capability of changing data formats. Thus an image message received from a mobile device 10 (MS-A) into receiver means 512 and stored in the format received, may be converted by the transmitter, by means not shown, into format suitable for transmission to

a facsimile transceiver 20 by the transmitter means 531. Likewise an image message received from a facsimile transceiver in G3 facsimile format in means 511 and stored in the format received, may be converted by the transmitter, by means not shown, into format suitable for transmission to a mobile device 10 (MS-B) by the transmitter means 532 as if that image data message had come from another mobile device 10 (MS-A).

It is envisaged that the store and forward unit SF will be capable of forwarding an image message to a group of users, that is a selected number of fixed or mobile devices, and also that the store and forward unit will be capable of forwarding an image message as a broadcast message to all mobile devices capable of receiving the handwritten graphical image information.

The internal structure of part of each of the mobile devices 10 (MS-A) and 10 (MS-B) is shown in Figures 6A and 6B. Figures 6A shows the internal flow and elements of device 10 (MS-A) for sending an image data message from an image entered on the screen 12, and Figure 6B shows the internal flow and elements of device 10 (MS-B) for receiving an image data message and displaying it on the screen 12. The elements and flow of Figures 6A and 6B are present in both mobile devices 10 (MS-A) and 10 (MS-B).

Referring to Figure 6A, a handwritten graphical image is entered on the screen 12 and passed to means 6A1 for digitally encoding that image. An address information image is, before or afterwards, entered on the screen 12 and also passed (flow 6A2) to encoding means 6A1. The user will enter via means 6A3 information as to whether the two encoded images are destined for another mobile device or for a document facsimile transceiver. If destined for another mobile device, the encoded images are converted to a suitably formatted two part image data message in means 6A4. If destined for a document facsimile transceiver, the mobile device may, as has been mentioned above have the facility via means 6A5 for converting the encoded images into a two part image data message formatted according to the

Group 3 facsimile standard protocol for communication over a data service of the digital cellular radio (e.g. GSM) mobile network. The image data message from means 6A4 or 6A5 is transmitted by transmitter means 6A6 of a radio interface to the mobile network (route 41). In accordance with the modified possibility mentioned above where conversion to facsimile format takes place later in the store and forward unit SF provided with the network 40, the conversion means 6A5 may be omitted and images destined for a facsimile transceiver may also be converted into an image data message in means 6A4.

Referring to Figure 6B, a two part image data message is routed (46) from the mobile network 40 to receiving means 6B1 of the radio interface of the mobile device. The type of message, that is whether it has been sent from another mobile device or from a facsimile transceiver, is detected in means 6B2. If the message is in facsimile format it is passed to means 6B4 for conversion into a form ready for decoding; otherwise the message is passed to means 6B3 for such conversion. The converted image message is received by decoding means 6B5 and decoded in two parts into a handwritten graphical image for display on the screen 12 and into a separate address image (flow 6B6) for display on the screen 12 before or after the handwritten image.

Referring now to Figure 7, there is shown a signal flow diagram illustrating successful first time dispatch of an image data message from a sending mobile device 10 (MS-A) to a destined mobile device 10 (MS-B). The message is sent (71) from device 10 (MS-A) to the network switching station NSS-A and then routed (72) to the store and forward unit SF. The unit SF provides, responsive to successful storage of the image message, an image-stored signal which is transmitted back to the mobile device 10 (MS-A) via the network switching station NSS-A (signal flow 73, 74). The store and forward unit SF is connected to the destined mobile device 10 (MS-B) via the network switching station NSS-B, and the image message is forwarded (75) from the unit SF to the station NSS-B and then sent (76) from the station NSS-B to the device 10 (MS-B). The mobile device 10 (MS-B) has means, not previously mentioned in relation to Figures 6A and 6B, responsive to

successful receipt of the image message, for providing an image-received signal for transmission back to the mobile device 10 (MS-A) via the network switching station NSS-B, the store and forward unit SF and the network switching station NSS-A (signal flow 771, 772, 773, 774).

5

Referring now to Figure 8, there is shown a signal flow diagram illustrating unsuccessful first time forwarding of an image data message from the store and forward unit SF to a destined mobile device 10 (MS-B) followed by successful such forwarding after a retry interval timed in the store and forward unit SF. The signal flow (71, 72) resulting in the image data message being stored in the unit SF and the return of an image-stored signal (73, 74) to the sending mobile device 10 (MS-A) is shown to be the same as for Figure 7 described above. The store and forward unit SF first forwards the stored image message to the station NSS-B (signal flow 751) without an indication from the station NSS-B whether or not the destined mobile device 10 (MS-B) is connected to the station 10 (MS-B). In this case the station NSS-B indicates to the unit SF that there has been a failure to connect to the device 10 (MS-B) (signal flow 81). The store and forward unit SF includes retry timing means RT such that, responsive to the failure indication (81) the store and forward unit SF again forwards the stored image message to the station NSS-B after a predetermined timed interval (signal flow 752). Figure 8 shows the case where at this point in time the device 10 (MS-B) is connected to the unit SF, and so the image message is then sent to the device 10 (MS-B) (signal flow 76) and an image-received signal is transmitted back from the destined device 10 (MS-B) to the sending device 10 (MS-A) (signal flow 771, 772, 773, 774) in the same manner as shown and described above in relation to Figure 7.

30 Referring now to Figure 9, there is shown a signal flow diagram illustrating unsuccessful first time forwarding of an image data message from the store and forward unit SF to a destined mobile device 10 (MS-B) followed by successful such forwarding after connection of the device 10 (MS-B) to the network has been indicated. The signal flow
35 (71, 72) resulting in the image data message being stored in the unit SF and the return of an image-stored signal (73, 74) to the sending mobile

device 10 (MS-A) is again shown to be the same as for Figure 7 described above. The store and forward unit SF again, as for Figure 8, first forwards the stored image message to the station NSS-B (signal flow 751) without an indication from the station NSS-B whether or not the destined mobile device 10 (MS-B) is connected to the station 10 (MS-B), and again, as for Figure 8, the station NSS-B indicates to the unit SF that there has been a failure to connect to the device 10 (MS-B) (signal flow 81). In this case the store and forward unit SF is responsive to the failure indication signal 81 to retain stored the image data message. At some time later the mobile device 10 (MS-B) will indicate its presence to the station NSS-B (signal flow 91). Responsive to a corresponding later indication from the station NSS-B of connection to the device 10 (MS-B) (signal flow 92) the store and forward unit SF will again forward the image data message to the station NSS-B. The image message is then sent to the device 10 (MS-B) (signal flow 76) and an image-received signal is transmitted back from the destined device 10 (MS-B) to the sending device 10 (MS-A) (signal flow 771, 772, 773,. 774) in the same manner as shown and described above in relation to Figures 7 and 8.

CLAIMS:

1. A communications system including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations; wherein

5 each said mobile device has a touch-sensitive display screen on which can be entered a handwritten graphical image destined for another said mobile device, first converting means for converting said graphical image into at least part of an image data message suitable for transmission via said network, and second converting means for
10 converting at least a corresponding part of a said image data message received via said network into a graphical image for display on said screen; and wherein

15 said network is provided with an image store and forward unit connectable between a first said network switching station associated with a first said mobile device sending a said image message and a second said network switching station associated with a second said mobile device for which said image message is destined, said store and
20 forward unit having an image store with means for storing said image message sent from said first mobile device via said first network switching station, and said store and forward unit having transmitting means including means for transmitting a stored image message via said second network switching station when said second mobile device
25 is connected to said second network switching station.

2. A communications system as claimed in claim 1, wherein said image data message includes a first message part corresponding to a first screen-size image having said handwritten image and a second
30 message part corresponding to a second screen-size image having address information, said first and second screen-size images being consecutively entered on the screen of a said first mobile device and being consecutively displayed on the screen of a said second mobile device.

3. A communications system as claimed in claim 1 or claim 2,
wherein said store and forward unit has means responsive to successful
storage of said image message for providing an image-stored signal for
transmission back to said first mobile device via the first network
switching station.

4. A communications system as claimed in any one of claims 1 to 3,
wherein each said mobile device has means responsive to successful
receipt of said image message when said mobile device is a said
second mobile device for providing an image-received signal for
transmission back to the corresponding first mobile device.

5. A communications system as claimed in any one of claims 1 to 4,
wherein the store and forward unit first forwards a stored image
message to a said second network switching station without an
indication from that second network switching station whether or not said
second mobile device is connected thereto, and wherein the store and
forward unit includes retry timing means such that, responsive to an
indication from that second network switching station of failure to
connect to said second mobile device, the store and forward unit again
forwards that stored image message to that second network switching
station after a predetermined time interval.

6. A communications system as claimed in any one of claims 1 to 4,
wherein the store and forward unit first forwards a stored image
message to a said second network switching station without an
indication from that second network switching station whether or not said
second mobile device is connected thereto, wherein the store and
forward unit is responsive to an indication from that second network
switching station of failure to connect to said second mobile device to
retain stored that image message, and wherein the store and forward
unit is responsive to a later indication from that second network
switching station of connection to said second mobile device to again
forward that stored image message to that second network switching
station.

7. A communications system as claimed in any one of claims 1 to 6, wherein said communications system includes means for effecting connection between a said mobile device and a document facsimile transceiver via a first said network switching station associated with that mobile device and via a said message store and forward unit, said digital network has the facility for conveying document facsimile images in a predetermined FAX data format wherein

in a said mobile device so connectable to a said facsimile transceiver via said network, said first converting means includes means for converting a said handwritten graphical image entered on said screen and destined for a said facsimile transceiver into at least part of a said image data message having said FAX data format in which said screen entered graphical image occupies a predetermined portion in a predetermined position with respect to a document facsimile message, and said second converting means includes means for converting said predetermined portion in said predetermined portion of a document facsimile image received as at least part of said image data message having said FAX data format into a graphical image for display on said screen; and wherein

said image store of a said image store and forward unit has means for storing a said image message having said FAX data format when received from a said mobile device or from a facsimile transceiver, and said transmitting means of a said image store and forward unit has means for transmitting in said FAX data format a stored said image message when connection is established between a said mobile device and a said facsimile transceiver.

8. A communications system as claimed in claim 7, wherein said image data message having said FAX data format includes a first FAX message part having a screen entered said handwritten image occupying a first said predetermined portion in a first said predetermined position with respect to a document facsimile image and a second FAX message part having a screen entered address image occupying a second predetermined portion in a second predetermined position with respect to a document image, said first and second FAX message parts having corresponding first and second screen-size FAX image parts

consecutively entered on the screen of a said mobile device sending to a document facsimile transceiver or respectively consecutively displayed on the screen of a said mobile device receiving from a document facsimile transceiver.

5

9. A communications system as claimed in claim 7 or claim 8, the system being modified in that the image data message sent from a said mobile device and destined for a said facsimile transceiver is not in said FAX data format and in that the transmitting means of the store and forward unit includes means for converting an image data message sent from a said mobile device into said FAX data format for transmission to said facsimile transceiver, the system also being modified in that an image data message received in said FAX data format from a said facsimile transceiver and destined for a said mobile device is converted by the store and forward unit into a data format for transmission to said destined mobile device as if that image data message had come from another said mobile device.

10. A method of sending and receiving image messages in a communications system including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations, the method including the steps of;

entering on a touch-sensitive display screen of a first mobile device a handwritten graphical image destined for a second said mobile device;

converting said destined graphical image into at least part of an image data message suitable for transmission from said first mobile device via said network;

sending said image message from said first mobile device via a first said network switching station associated with said first mobile device to an image store and forward unit provided with said network;

storing said image message in said image store and forward unit;

connecting said image store and forward unit to said second mobile device via a second said network switching station associated with said second mobile device;

transmitting said image message from said store and forward unit to said connected second mobile device;

converting a corresponding at least part of said image message received in said second mobile device into a received graphical image;

5 and

displaying said received graphical image on a corresponding touch-sensitive display screen of said second mobile device.

11. A method of sending and receiving messages as claimed in claim
10 10, wherein said image data message includes a first message part corresponding to a first screen-size image having said handwritten image and a second message part corresponding to a second screen-size image having address information, the method including the further steps of consecutively entering said first and second screen-size images
15 on the screen of a said first mobile device and consecutively displaying said first and second screen-size images on the screen of a said second mobile device.

12. A method of sending and receiving image messages as claimed
20 in claims 10 or claim 11, further including the steps of;

said store and forward unit providing, responsive to successful storage of said image message, an image-stored signal, and

said store and forward unit transmitting said image-stored signal back to said first mobile device via the first network switching station.

25

13. A method of sending and receiving image messages as claimed in any one of claims 10 to 12, further including the steps of;

said second mobile device providing, responsive to successful receipt of said image message, an image-received signal, and

30 said second mobile device transmitting said image-received signal back to the first mobile device via the second network switching station, the store and forward unit and the first network switching station.

14. A method of sending and receiving image messages as claimed
35 in any one of claims 10 to 13, further including the steps of;

the store and forward unit first forwarding a stored image message to a said second network switching station without an indication from that second network switching station whether or not said second mobile device is connected thereto; and

5 the store and forward unit, responsive to an indication from that second network switching station of failure to connect to said second mobile device, again forwarding that stored image message to that second network switching station after a predetermined time interval.

10 15. A method of sending and receiving image messages as claimed in any one of claims 10 to 13, further including

the store and forward unit first forwarding a stored image message to a said second network switching station without an indication from that second network switching station whether or not said
15 send mobile device is connected thereto;

the store and forward unit, responsive to an indication from that second network switching station of failure to connect to said second mobile device, retaining that stored image message; and

20 the store and forward unit, responsive to a later indication from that second network switching station of connection to said second mobile device again forwarding that stored image message to that second network switching station.

25 16. A method of sending and receiving image messages in a communications system including a plurality of pocket-sized mobile telephone devices and a digital cellular radio communications network for connecting the mobile devices via network switching stations, said communications system including means for effecting connection between a mobile device and a document facsimile transceiver via a
30 network switching station associated with that mobile device, said digital network having the facility for conveying document facsimile images in a predetermined FAX data format; the method including the steps of;

entering on a touch-sensitive display screen of the mobile device a handwritten graphical image destined for the facsimile transceiver;

35 converting in said mobile device said image into part of an image data message having said FAX data format and in which the graphical

image occupies a predetermined portion in a predetermined position of a document facsimile image;

5 sending the document facsimile image as an image data message from the mobile device via the network switching station associated with said mobile device to an image store and forward unit provided with said network;

storing the image data message in said image store and forward unit;

10 connecting said image store and forward unit to said destined facsimile transceiver; and

transmitting said image data message from said store and forward unit to said connected facsimile transceiver.

17. A method of sending and receiving image messages as claimed
15 in claim 16, including the further steps of;

entering on said screen of said mobile device an address image destined with said handwritten image for said facsimile transceiver; and

20 converting in said mobile device said destined address image into a second FAX message part of said image data message, said second FAX message part occupying a second predetermined portion in a second predetermined position with respect to the document facsimile image.

18. A method of sending and receiving image messages as claimed
25 in claim 16 or 17, the method being modified in that the image data message sent from said mobile device and destined for said facsimile transceiver is not in said FAX data format, and the method including the further step of;

30 converting said image message stored in said image store and forward unit into said FAX data format prior to transmitting said image message to said connected facsimile transceiver.

19. A method of sending and receiving image messages in a communications system including a plurality of pocket-sized mobile
35 telephone devices and a digital cellular radio communications network for connecting said mobile devices via network switching stations, said

communications system including means for effecting connection between a document facsimile transceiver and a said mobile device via a said network switching station associated with that mobile device, said digital network having the facility for conveying document facsimile images in a predetermined FAX data format; the method including the steps of;

entering into a said facsimile transceiver a graphical image destined for a said mobile device, said graphical image occupying a predetermined portion in a predetermined position as part of a document facsimile image;

sending said document facsimile image as an image message in said FAX data format to an image store and forward unit provided with said network;

storing said image message in said image store and forward unit;

connecting said image store and forward unit to said destined mobile device via a said network switching station associated with said mobile device;

transmitting said image message from said store and forward unit to said mobile device;

converting in said mobile device said predetermined portion in said predetermined position of said document facsimile image received as said image message into said graphical image; and

displaying said graphical image on the display screen of said mobile device.

20. A method of sending and receiving image messages as claimed in claim 19, wherein an address image occupying a second predetermined portion in a second predetermined position as part of the same said document facsimile image is entered with said graphical image into said facsimile transceiver, and wherein the method includes the further steps of;

connecting in said mobile device said second predetermined portion in said second predetermined position of said document facsimile image received as said image message into said address image; and

consecutively displaying said handwritten image and said address image on said screen of said mobile device.

21. A method of sending and receiving image messages as claimed
5 in claim 19 or claim 20, the method being modified in that it includes the further step of;

converting said image message stored in said image store and
forward unit from said FAX data format into a data format as if that
image message had come from a said mobile device prior to
10 transmitting said image message to said destined mobile device.

22. A communications system substantially as herein described with
reference to and as shown in the accompanying drawings.

- 15 23. A method of sending and receiving messages substantially as
herein described with reference to and as shown in the accompanying
drawings.